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The Impact of Standards on Egyptian Trade: Evidence from SPS Measures[*]

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Abstract: According to the World Trade Organization (WTO) standards, countries are allowed to adapt regulations under the Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade (TBT) agreements in order to protect human, animal and plant health as well as environment and human safety. Therefore, using an Egyptian firm-level dataset, we analyze the effects of product standards on exports. We merge this dataset with a new database on specific trade concerns raised in the TBT and SPS committees at the WTO. Our main findings show that SPS measures imposed on Egyptian exporters have a negative impact on the probability of exporting a new product to a new destination. By contrast, the intensive margin of exports is not significantly affected by such measures.

[*]We gratefully acknowledge the General Organization for Export and Import Control (GOEIC), the Ministry of Industry and Foreign Trade in Egypt, for providing us with the firm-level data used in this study. Finally, we are grateful to the World Bank team for their useful comments.
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1. Introduction

The World Trade Organization (WTO) has adopted several efforts in order to reduce tariffs since the birth of the General Agreement on Tariffs and Trade (GATT) in 1948. Data from the World Development Indicators database shows that the trade-weighted average tariff has declined from 34 % in 1996 after the WTO creation to 2% in 2010. This has been observed for both primary and manufacturing products. Indeed, while for the manufacturing products, the trade-weighted average tariff has declined from 5% to 3%, that of primary products has decreased from 111% to 2% over the same period. Yet, despite this significant liberalization, non-tariff measures (NTMs) have constantly increased thus raising new challenges for the international trade policy. For this reason, more attention has progressively shifted towards them given that they pose several concerns for transparency, reasons behind their implementation and above all their detrimental effect on trade flows. According to Moise and Bris (2013), NTMs refer to all policy interventions, other than tariffs, that affect trade in goods and services. These interventions encompass import quotas, export restraints, government procurement, technical barriers to trade (TBT), sanitary and phyto-sanitary measures (SPS), rules of origin, domestic content requirements, etc. Indeed, the empirical literature on trade policy has shown that NTMs add on average an additional 87% on the restrictiveness imposed by tariffs (Kee et al. 2009). Moreover, according to Anderson and van Wincoop (2004), non-tariff measures (NTMs) are more problematic than tariff barriers. In fact, in comparison to tariffs, NTMs are concentrated in a smaller number of sectors and in those sectors they are much more restrictive.

This paper deals with one NTM among this host of measures, namely sanitary and phyto-sanitary measures that deal with food safety and animal and plant health. These measures aim to ensure that a country's consumers are being supplied with food that is safe to eat — by acceptable standards — while also guaranteeing that strict health and safety regulations are not being used as an excuse to protect domestic producers from competition. For this reason, countries are allowed to adapt regulations under the Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade (TBT) agreements in order to protect human, animal and plant health as well as environment and human safety. According to World Trade Organization (WTO, 2010) standards "*It allows countries to set their own standards. But it also says regulations must be based on science. They should be applied only to the extent necessary to protect human, animal or plant life or health. And they should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail*." It is worthwhile to note that the number of countries imposing SPS measures, as well as the number of SPS notifications has been on the rise since the number of SPS notifications has reached 1100 measures in 2010 up from 200 measures in 1995.

This paper contributes to the literature in three ways. First, it marks one of the very first studies on developing countries on the topic, and the first in the Middle East and North Africa (MENA) region. It also uses a unique dataset that was constructed by the authors using a new database on specific trade concerns (STC) raised in the TBT and SPS committees at the WTO. Thus, we created a dataset that could be combined with Egyptian firm-level data. Finally, we examine the impact of these measures on both the extensive (the probability of exporting to a new destination) and the intensive (the value exported) margins of exports using a gravity model. Our main findings show that SPS measures imposed on Egyptian exporters have a negative impact on the probability of exporting a new product to a new destination. By contrast, the intensive margin of exports is not significantly affected by such measures.

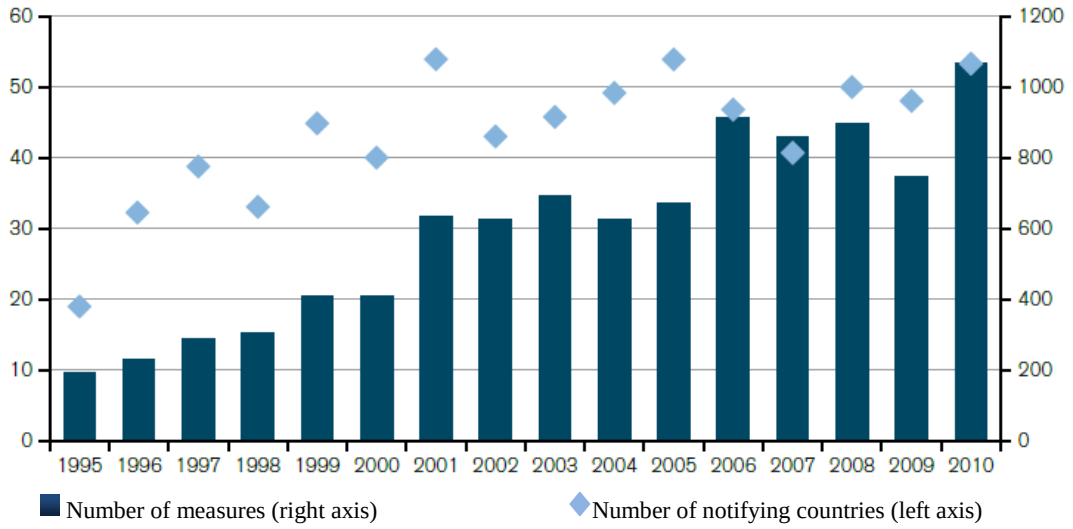
In what follows, section 2 presents some stylized facts on SPS measures. Section 3 reviews the literature on SPS measures. Section 4 exhibits the methodology adopted in our study. Section 5 is devoted to data presentation. In section 6, we present the empirical results. Section 7 concludes and presents policy implications of the study.

2. Overview of Sanitary and Phyto-Sanitary Measures

2.1. A Global Picture of SPS Measures

On a global level, countries have been increasingly resorting to NTMs, especially TBT and SPS measures. As countries notify the WTO upon imposing SPS measures, it can be seen through tracking the WTO notifications that the number of countries imposing SPS, as well as the number of SPS notifications has been on the rise since the number of SPS notifications has reached 1100 measures in 2010 up from 200 measures in 1995(Figure 1).

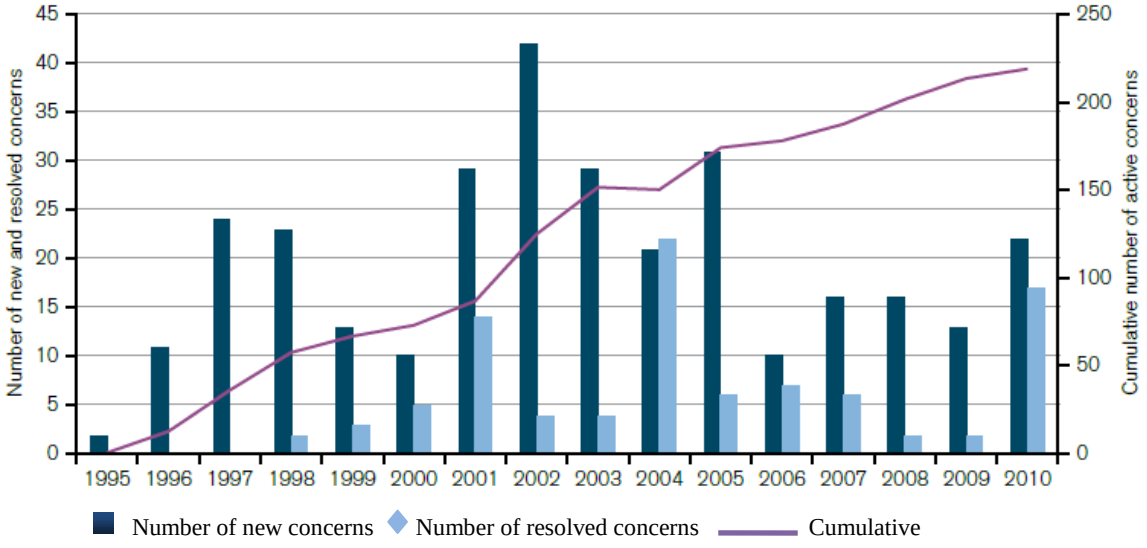
Figure 1: SPS Notifications to WTO (1995-2010)



Source: WTO TIP database, based on WTO's World Trade Report 2012.

While notifying the WTO with the SPS measures, imposing countries support their measures by explaining the related specific trade concerns (STCs). The number of newly initiated concerns, as well as the resolved ones, have been fluctuating over the years. Yet, the cumulative number of SPS concerns raised has been increasing from 1995 to 2010, as Figure 2 shows. According to the WTO's World Trade Report 2012, about 30% of the reported STCs between 1995 and 2010 were resolved. The number of resolved concerns over the years can reflect the effectiveness of SPS measures, since they reveal the exporters' compliance to the measures imposed. It should be noted, however, that some concerns could have been resolved, without the SPS Committee being notified.

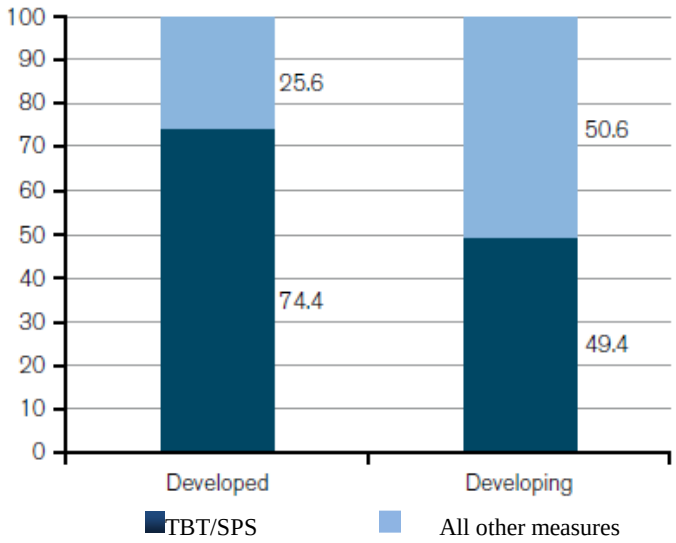
Figure 2: New and Resolved SPS Specific Trade Concerns (1995-2010)



Source: WTO STC database, based on WTO's World Trade Report 2012.

The International Trade Centre (ITC) database provides even more additional insight on the nature of NTMs imposed as well as the countries imposing them. As Figure 3 illustrates, SPS and TBT measures are imposed more by developed nations, compared to developing nations. About 74% of all non-tariff measures imposed by developed countries are SPS and TBT measures. Meanwhile, SPS and TBT measure account for about 49.4% of NTMs imposed by developing nations. It can also be derived from the figure that together, SPS and TBT are the most widely used type of NTMs applied by both developed and developing nations.

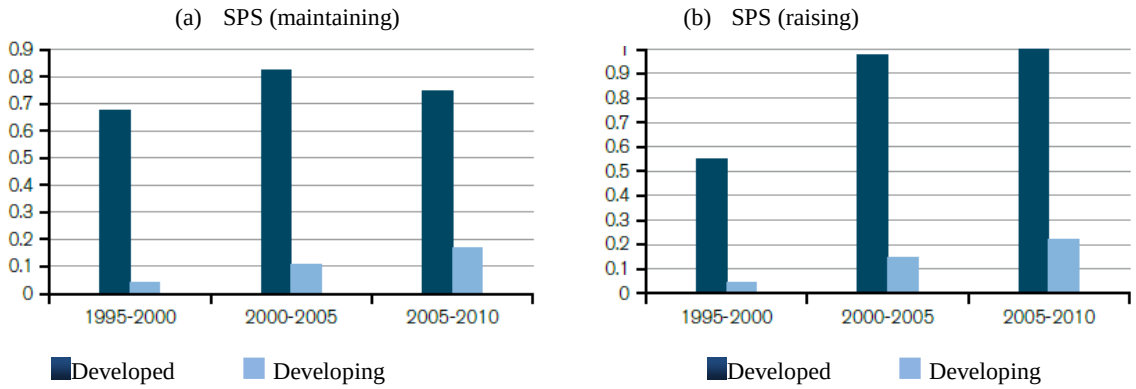
Figure 3: NTMs Applied by Developed vs. Developing Nations



Source: ITC business surveys on NTMs, based on WTO's World Trade Report 2012.

ITC's data can also allow us to distinguish between the number of STCs raised and the ones maintained by developed and developing nations. As Figure 4 shows, the percentage of developed nations that raise STCs is much higher than the percentage of developing nations. Close to 100% of developed nations have raised STCs between 2005 and 2010, while only close to 20% of developing nations have raised STCs during the same period. Yet for both country groups, the share of countries raising STCs has been increasing. Developed nations also maintain more SPS concerns, compared to developing countries. However, the share of developed nations has decreased between 2005 and 2010, while the share of developing nations maintaining SPS has been increasing between 1995 and 2010.

Figure 4: STC "Maintaining" and "Raising" Countries (share of total number of countries in the respective income group)



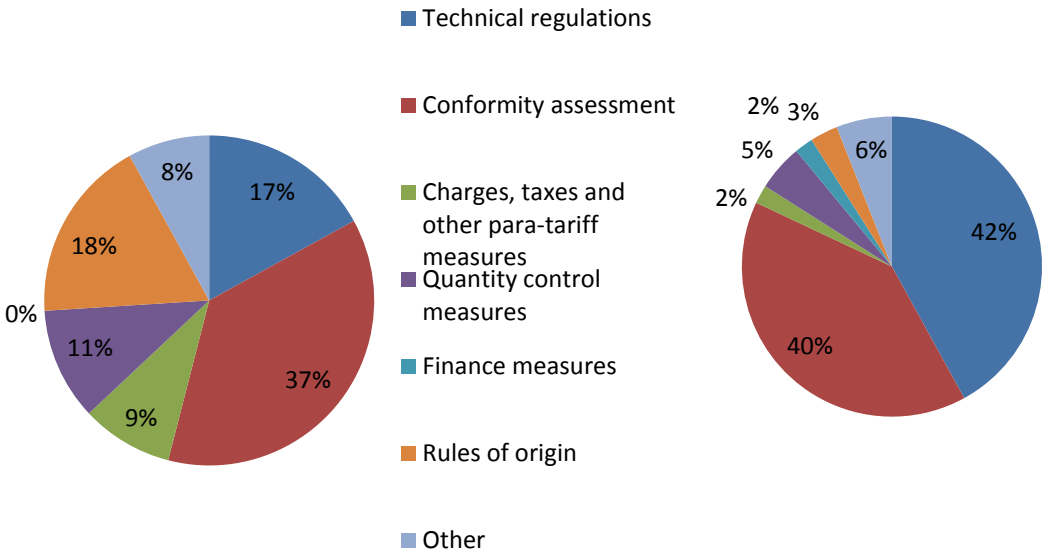
Source: WTO ITC database, based on WTO's World Trade Report 2012.

2.2. SPS Measures in the League of Arab States

Exporters need to comply with the different NTMs imposed by their trading partners in order to be allowed to export their products. As Figure 5indicates, most of the NTMs imposed among the League of Arab States countries on agricultural exports are conformity assessment measures (37%). Meanwhile, Non-League of Arab States countries mostly impose technical regulations and conformity assessment measures on Arab League nations, accounting respectively for 42% and 40% of NTMs applied. Both technical regulations and conformity assessment measures assess whether the products abide by specific standards, which are SPS measures in the case of agricultural products.

Figure 5: Agricultural Exports: Types of NTMs Applied by Partner Countries

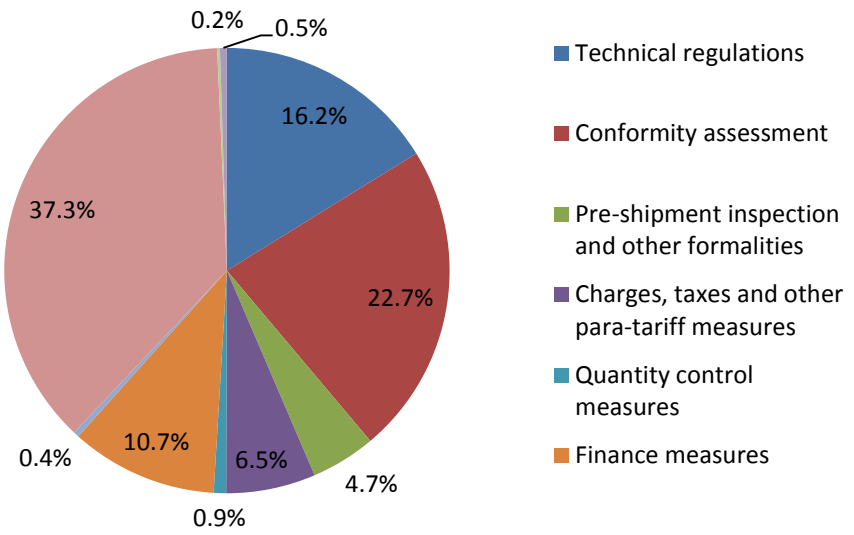
(a) League of Arab States (b) Non-League of Arab States



Note: ITC (2012) staff calculations. Data comes from ITC NTM surveys in Egypt, Morocco and Tunisia. League: Simple average of types of challenging measures applied by League partner countries that were reported by companies in Egypt and Tunisia (no cases in Morocco). Non-League: simple average of types of measures applied by non-League partner countries that were reported by companies in Egypt, Morocco and Tunisia.

In the case of manufacturing exports, rules of origin are the most common non-tariff measure applied by trading countries among the League of Arab States countries (Figure 6). Rules of origin refer to where the products were produced, and could be affected by trading quotas, anti-dumping actions, preferential agreements, etc. Conformity assessments and technical barriers also account for a large percentage of NTMs applied among League of Arab States.

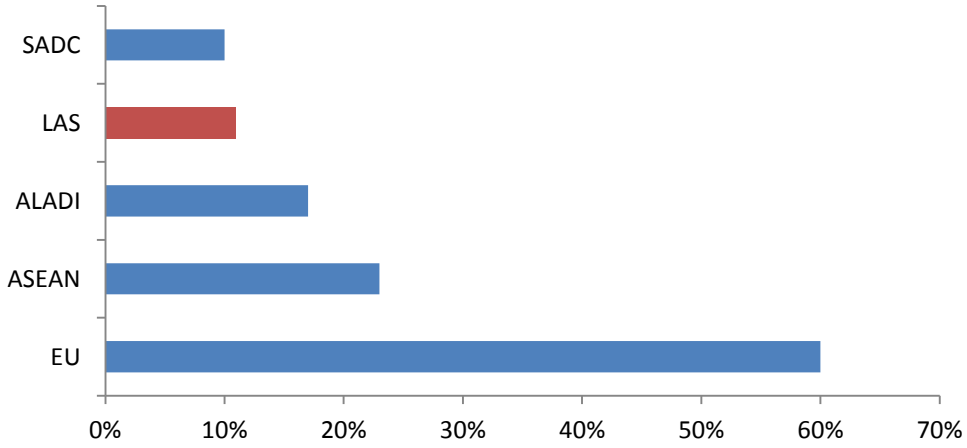
Figure 6: Manufacturing Exports: Types of NTMs Applied by Partner Countries on League of Arab States



Source: ITC, 2012.

As a result of the lack of shared common technical regulations and conformity measures between Arab countries, intra-trade among the Leagues of Arab States is quite low, as it accounts for 11% of trade while intra-trade among the European Union countries accounts for 60% of trade in the region (Figure 7).

Figure 7: Intra-Regional Trade Shares around the World (2010 – excluding oil)

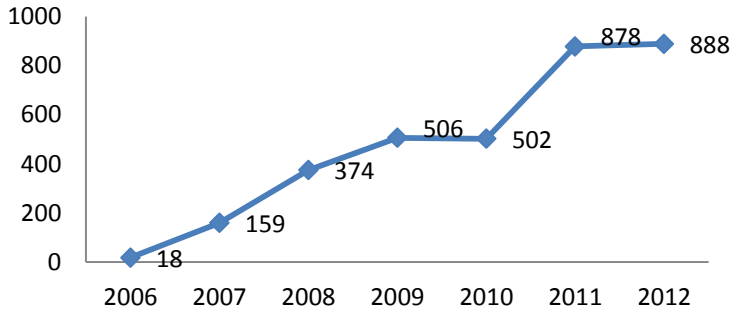


Note: ITC (2012) staff calculations. Data comes from CEPII's BACI database. Interregional trade is given as a percentage of total trade by region. Total trade is defined as (exports + imports). Data is for 2010 and excludes oil. The European Union is the group of the 27 current member states except Belgium and Luxembourg. The Association of Southeast Asian Nations comprises all 10 member states. ALADI (Asociacion Latinoamericana de Integracion) is a trade agreement among 12 Latin American countries. The South African Development Community comprises 15 member states.

2.3. A Closer Look on SPS Measures in Egypt

On another hand, the available data from the WTO allows us to draw a picture for the SPS measures imposed on Egyptian exports, the imposing countries' characteristics as well as the effect of SPS measures on exports. First, it is worth mentioning that the number of SPS measures imposed on Egypt increased exponentially during the period of study, from 18 in 2006 to 888 in 2012 as shown in Figure 8. This is in line with the significant trade liberalization that implied first low levels of tariffs and more non-tariff measures imposed on trade flows, especially between developing and developed countries.

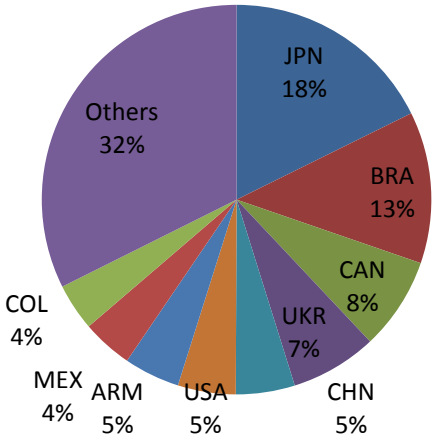
Figure 8: Number of SPS Measures 2006-2012



Source: Constructed by authors using WTO SPS data.

Figure 9 shows that the five highest imposing countries of SPS measures on Egypt are either developed countries, such as Japan and Canada, or emerging economies, such as Brazil, Ukraine and China. However, these countries impose SPS measures on products that Egyptian firms do not export.

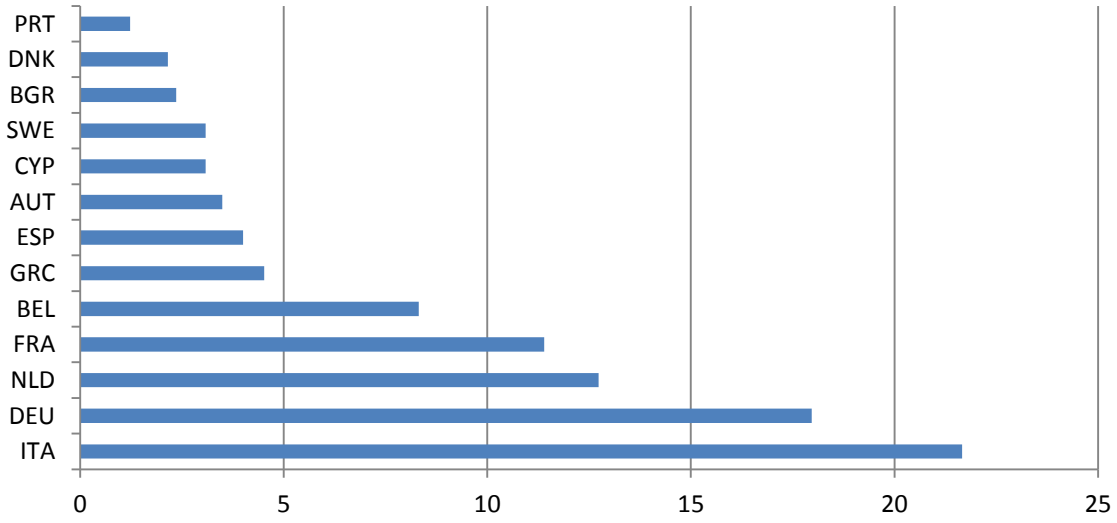
Figure 9: SPS Measures Imposed on Egypt by Country (in %)



Source: Constructed by the authors using WTO SPS data.

All SPS measures on products exported by Egypt are imposed by European countries (Figure 10). Europe is one of Egypt's largest trading partners; exports to Europe account for close to 50% of Egypt's exports. For instance, in 2011 and 2012, the European Union imposed SPS measures on leguminous vegetables, beans and seeds imported from Egypt, stating food safety, and protection of humans, animals and plants from pests and diseases as the reason for implementing the SPS measure.

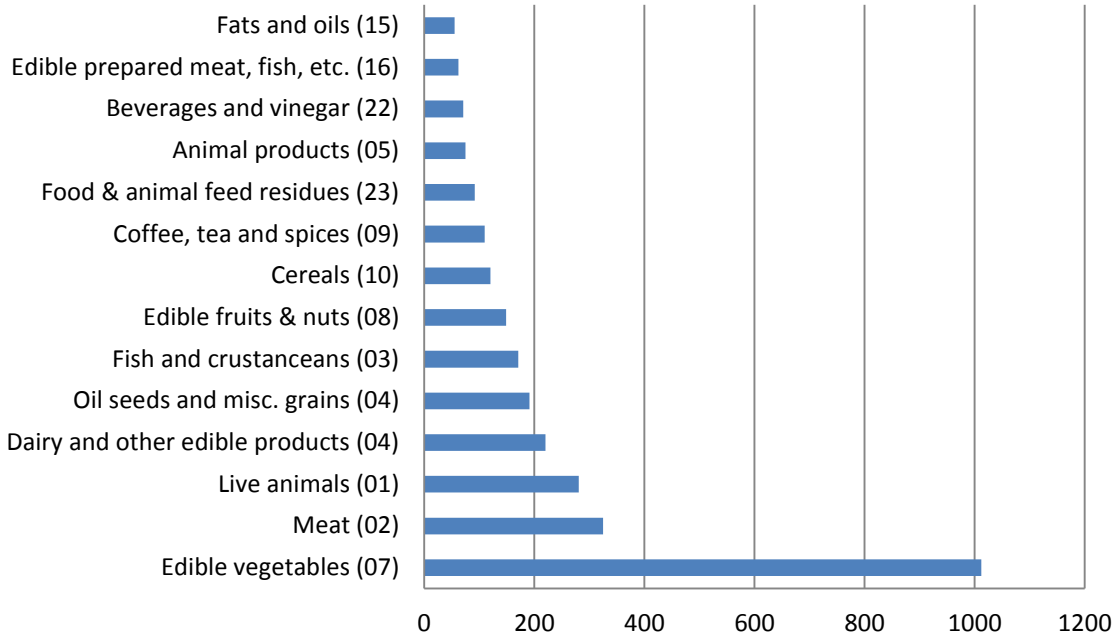
Figure 10: SPS Measures Imposed by European Countries on Egypt (in %)



Source: Constructed by authors using WTO SPS data.

In addition, through observing average exports per product, it can be deduced that the average value of exports for products not targeted by SPS measures is almost triple the value of products targeted by SPS. Most SPS measures on Egypt are in fact imposed on food products, given the risks they pose on human health. Countries put SPS measures on such products to prevent diseases to humans, animals as well as plants. At the HS2 level, the highest number of SPS measures is imposed on edible vegetables, as Figure 11 shows. The number of SPS measures on vegetables is more than triple those on meat and meat offal, and live animals, the second and third largest SPS targeted products respectively.

Figure 11: SPS Measures Imposed on Egypt (by sector, at the HS2 level)



Source: Constructed by authors using WTO SPS data.

3. Literature Review

The literature available on the impact of applying NTMs on trade is limited, and remains divided on its effect on trade flow (Anders and Caswell 2009). Several studies focused on analyzing the topic from a more aggregate perspective, studying more than one country, using macro data. Moenius (2004) studied the effect of standards on 471 industries for 12 OECD countries through a gravity model and concluded that in manufacturing, country-specific standards tend to promote international trade, while in non-manufacturing they tend to induce barriers to trade. Disdier et al. (2008) found that when OECD exporters are exporting to other OECD countries, their exports are not significantly affected by SPS and TBT, while developing and least developing countries' exports are adversely affected. Meanwhile, Chen et al. (2006) assessed the effects of standards and technical regulations of five developed countries, on the exports of 17 developing countries from different regions using the World Bank Technical Barriers to Trade Survey. They also concluded that standards adversely affect exporting firms from developing countries, in both their propensity to export and their market diversification.

Shepherd (2007) studied EU product standards in the textiles, clothing, and footwear sectors, and concluded while product standards have a negative impact on partner country export variety, international harmonization of standards can act as a mitigating factor as it leads to an increase in export variety. Fontagné et al. (2005) studied trade data on 5,000

products, for 96 countries to assess the impact of environmental measures across countries and industries, using all environmental-related notification to the World Trade Organization for 2001 and product data at HS 6-digit level (World Custom Organizations' Harmonized System). Their study found that SPS and TBT measures have a negative impact on the trade of fresh and processed food, while there is an insignificant yet positive effect on manufactured products.

There have been few country-specific studies on the topic as well, as firm level data is not widely available, with almost none of these studies on developing countries. Work by Swann et al. (1996) on UK exports and import, indicated that standards promote both exports and imports, with a greater effect on exports. The study analyzed the effect of standards on UK trade performance, using trade data for 83 three-digit Standard Industrial Classification (SIC) manufacturing codes, and concluded that trade standards promote intra-industry trade and that idiosyncratic standards promote exports. On the other hand, Reyes (2011) examined the response of exports from US manufacturing firms to the harmonization of EU product standards, using the census of Manufacturers of the Longitudinal Research Database of the U.S. Census Bureau, and concluded that US exports increased at the extensive margin, following harmonization, as more US electronics firms entered the EU market. Yet, the study showed that the impact of harmonization has been negative on the intensive margin of trade, but that the impact of the extensive margin outweighs that of the intensive margin.

More recent research by Fontagné et al. (2013) studied the trade effects of SPS measures on export performance at the firm level, both on the intensive and extensive margins as well. They conducted their study on French exporting firms, looking at trade participation, intensity of trade and the unit value of products exported in the presence of an SPS measure at the product and destination level. The study concluded that imposing SPS measures reduces firm's participation at the extensive margin. Yet, the effect of SPS on the intensive margin remained to be unclear, as a negative effect was only witnessed at the level of exports for firms operating in marginal markets.

This paper contributes to the literature in three ways. First, it marks one of the very first studies on developing countries on the topic, and the first in the MENA region. It also uses a unique dataset that was constructed by the authors using the WTO SPS measures (available on http://spsims.wto.org). Thus, we created a dataset that could be combined with Egyptian firm-level data. Finally, we examine the impact of these measures on both the extensive and the intensive margins of exports.

4. Methodology

The methodology used in this paper draws on the pioneering work of Tinbergen (1962) and Anderson (1979): the gravity model, which has nowadays become an essential tool in the empirics of international trade to assess the determinants of trade in goods and services. The gravity model has undergone significant theoretical and empirical improvements over the years (Mac Callum 1995; Fujita et al. 2000; Feenstra et al. 2001; Feenstra 2002; Anderson and van Wincoop 2003; Evenett and Keller 2002; Santos Silva and Tenreyro 2006; Fontagné and Zignago 2007).

To measure the intensive margin of exports, our dependent variable is the value of trade of product *k* between firm *i* in Egypt and country *j* at year *t* (X_{kijt}). Our explanatory variables are GDP of Egypt and GDP of partner *j*, several variables measuring transaction costs that include transport costs measured by the bilateral distance between Egypt and its partner *j*(d_{ij}), some dummies capturing whether one country was a colony of the other at some point in time (Col_{ij}), whether the two countries share a common border ($Conti_{ij}$) or share common language ($Lang_{ij}$). To control for other trade policy variables, we introduce the average applied tariff in the manufacturing sector (Tar_j).

Moreover, to examine the impact of SPS measures on Egyptian exports, we introduce two dummies. The first (*SPSbyEgy*) takes the value of 1 if Egypt imposes an SPS measure on product *k* imported from country *j* and the second variable (*SPSonEgy*) takes the value of 1 if country *j* imposes an SPS measure on product *k* imported from Egypt as follows:

$$Ln(X_{ijt}) = \beta_0 + \beta_1 ln(GDP_{EGY,t}) + \beta_2 ln(GDP_{j,t}) + \beta_3 ln(d_{ij}) + \beta 4\ Col_{ij} + \beta_5 Comcol_{ij} + \beta_6 Conti_{ij} + \beta_7 Lang_{ij} + \beta_8\ SPSonEgy_{kjt} + \beta_9 SPSbyEgy_{kjt} + \varepsilon_{ijt} \quad (1)$$

Where ϵ_{ijt} is the discrepancy (error) term.

We drop all single exporters in order to have persistent ones only. It is worth mentioning that when we use fixed effects, time-invariant variables are automatically dropped from our regressions such as bilateral distance, colonial links, common colonizer, contiguity and common language. Moreover, when we include year dummies, the GDP of Egypt is also dropped given that it changes by year only. For this reason, the equation we run is the following:

$$Ln(X_{ijt}) = \alpha_0 + \alpha_1 ln(GDP_{j,t}) + \alpha_2 ln(Tar_{jt}) + \alpha_3 SPSonEgy_{kjt} + \alpha_4 SPSbyEgy_{kjt} + y_t + v_{ijt} \quad (2)$$

Where y_t are year dummies and v_{ijt} the discrepancy term.

Running this linear model with two high–dimensional fixed effects (products and firms effects) is a tough task. For this reason, we used the Stata package developed by Guimaraes and Portugal (2009)[**].

On another note, we run a similar regression to measure the extensive margin by regressing the probability of serving a new destination as follows:

$$Pr(X_{ijt}) = \gamma_0 + \gamma_1 \ln(GDP_{j,t}) + \gamma_2 \ln(Tar_{jt}) + \gamma_3 SPSonEgy_{kjt} + \gamma_4 SPSbyEgy_{kjt} + y_t + \mu_{ijt} \quad (3)$$

with μ_{ijt} the discrepancy term. This regression is run using both a probit model and a linear probability model (LPM). We assume that the unobserved firm heterogeneity to be random by running a standard LPM with the firm effects being random. Although the LPM does not produce consistent response probabilities, it is informative since the coefficients value are easily interpreted (elasticities for continuous variables).

Auxiliary regressions are run using different dependent variables. These regressions capture both the intensive margin (the average exports per destination) and the extensive margin (the number of firms per destination).

5. Data

First, trade data comes from the General Organization for Export and Import Control (GOEIC), the Ministry of Industry and Foreign Trade in Egypt from 2006 to 2012. This dataset has four dimensions: exporting firm, year, destination and product (at the HS4 level) for two variables which are value and quantity of exports. However, one drawback of this data is that we cannot explore the link between export behavior and firms' performance measures. Such analysis may be conducted if the exporter-level transaction data can be merged with industrial census data including key firm characteristics such as employment, profits, gross output per worker and wages.

Second, we rely on the SPS Information Management System (SPS-IMS) that provides a comprehensive access to documents and records relevant under the WTO Agreement on the Application of SPSmeasures. The SPS-IMS allows tracking information on SPS measures that member governments have notified to the WTO. This includes specific trade concerns raised in the SPS Committee and SPS-related documents circulated at the WTO. In general, members are required to notify any new or changed SPS measure which significantly affects trade and differs from international standards, guidelines or recommendations. For that purpose, members have to designate a central government

[**] This package works only with linear models. This is why it was not applied when using fixed effects or models with limited dependent variables.

"Notification Authority" to deal with the notification procedures. Finally, enquiry points have to be set up to respond to requests for information on new or existing measures. This dataset includes the document symbol, submitting member, dates of communication/receipt/distribution, products affected (HS codes), countries/regions affected and notification keywords. We created our own dataset using these notifications by giving a value of 1 to the product *k* subject to a specific measure imposed by country *j* in year *t* and 0 otherwise.

Finally, we compile our gravity-type variables from different sources. The Gross Domestic Product (GDP) for each country comes from the World Development Indicators database online (2011) that provides GDP in constant 2000 USD[††]. Other classic gravitational variables, for instance contiguity, common language, distance, common colonizer, etc. come from the Centre des Etudes Prospectives et d'Information Internationales (CEPII) Distance database (available on www.cepii.fr).

6. Empirical Results

6.1. The Effect of SPS Measures on the Intensive Margin

As mentioned before, we examine the impact of SPS measures of the exports performance of Egyptian firms. We undertake this analysis at the HS4 level given that this is the most disaggregated level provided in the data. We decompose the exports performance into two parts: the intensive margin (the value of exports and the average exports of each product by destination) and the extensive margin (the probability of exporting a certain product to a new destination and the number of firms per product and per destination).

First, Table 1 presents the impact of SPS measures on the intensive margin. When we run panel regressions, we found that both of the measures imposed on and by Egypt are insignificant in the fixed effects (FE) model. By contrast, in the random effects (RE) model, while those imposed on Egypt do have a significantly negative impact on Egyptian exports, those imposed by Egypt do not have a significant effect. To choose between the two models, we run a Hausman test that checks a more efficient model against a less efficient but consistent model. Under the null hypothesis, the coefficients under FE and RE are consistent but the RE is more efficient, whereas under the alternative hypothesis, only the FE is unbiased and consistent. Here, the null hypothesis is rejected, thus the fixed effects specification should be favored over the random effects specification. Consequently, it is quite clear that the effect of SPS measures on the intensive margin of Egyptian exports is not significant.

[††]Dollar figures for GDP are converted from domestic currencies using 2000 official exchange rates.

Table 1: The Impact of SPS Measures on the Value of Exports (Intensive Margin) – Panel Regression

	FE	RE	FE	RE
	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)
Ln(GDP imp)	1.168***	0.0628***	1.268***	0.0721***
	(0.115)	(0.00518)	(0.121)	(0.00534)
Ln(Distance)	-	-0.316***	-	-0.315***
	-	(0.0135)	-	(0.0138)
Contig	-	0.0682*	-	0.0214
	-	(0.0379)	-	(0.0390)
Com. Lang	-	-1.041***	-	-0.962***
	-	(0.0192)	-	(0.0197)
Colony	-	-0.0802**	-	-0.0983***
	-	(0.0360)	-	(0.0369)
Ln(Tariff)	0.781	7.360***	1.118	6.894***
	(0.769)	(0.196)	(0.813)	(0.203)
SPS on Egypt	**0.102**	**-0.520*** **	**0.107**	**-0.349*** **
	(0.151)	**(0.103)**	**(0.151)**	**(0.102)**
SPS by Egypt	**-0.0747**	**-0.0851**	**-0.0715**	**-0.0132**
	(0.142)	**(0.125)**	**(0.142)**	**(0.125)**
Constant	-21.18***	9.335***	-23.85***	8.837***
	(2.962)	(0.139)	(3.125)	(0.143)
Year dummies	YES	YES	YES	YES
HS1 dummies			YES	YES
Observations	210556	210556	195219	195219
R-squared	0.017		0.017	
Number of id	141229	141229	131097	131097

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

In Table 2, when we pool our dataset and introduce different dummies and combination of dummies (year, firms, products, HS1 and HS2), the effect of SPS measures imposed on Egypt turns to be either slightly positive or insignificant. The one imposed by Egypt is always insignificant. Given the instability of these results, we can claim that the effect of SPS measures on the intensive margin is in general insignificant, meaning that such measures do not affect the value of imports at the firm-level.

Table 2: The Impact of SPS Measures on the Value of Exports

(Intensive Margin) – Pooled Dataset

	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)
Ln(GDP imp)	0.143***	0.723***	0.596***	0.904***	0.875***	0.843***	0.962***
	(0.00567)	(0.136)	(0.131)	(0.132)	(0.141)	(0.141)	(0.146)
Ln(Distance)	-0.191***	-0.0105	0.0278	0.454	0.227	0.381	0.209
	(0.0148)	(5,885)	(3,974)	(1,148)	(1,052)	(4,044)	(3,925)
Contig	0.260***	0.0254	-0.00151	-0.257	2.619	1.872	-0.296
	(0.0503)	(7,529)	(5,562)	(1,181)	(834.9)	(4,485)	(7,750)
Com. Lang	-0.0554**	-0.167	0.0331	-0.177	1.448	-0.208	-0.000219
	(0.0249)	(4,251)	(4,821)	(2,833)	(1,023)	(2,294)	(5,286)
Colony	0.100**	1.083	0.484	1.165	0.676	2.198	-0.262
	(0.0403)	(13,945)	(5,365)	(2,296)	(2,491)	(3,973)	(4,105)
Ln(Tariff)	3.134***	0.294	0.280	-0.104	-1.085	-0.739	-0.530
	(0.231)	(0.949)	(0.911)	(0.896)	(0.933)	(0.929)	(0.982)
SPS on Egypt	**0.383*** **	**0.154**	**0.162**	**0.407*** **	**0.413***	**-0.0560**	**-0.0134**
	(0.136)	**(0.136)**	**(0.137)**	**(0.136)**	**(0.217)**	**(0.150)**	**(0.142)**
SPS by Egypt	**-0.0313**	**0.138**	**0.261**	**-0.0767**	**-**	**-**	**-0.0354**
	(0.185)	**(0.162)**	**(0.162)**	**(0.169)**	**-**	**-**	**(0.155)**
Year dummies	YES	YES	YES	YES			
Firm dummies	YES	YES	YES				
Product dummies	YES			YES			
Destination dummies		YES	YES				
HS1 dummies		YES					
Firm-destination dummies				YES	YES	YES	YES
Year*Product dummies					YES		
Year*HS2 dummies						YES	
Year*HS1 dummies							YES
Observations	122736	113487	122736	122736	122736	122736	113487
R-squared	0.531	0.511	0.493	0.675	0.691	0.657	0.652

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

In Table 3, we measure the intensive margin by the average exports of products by destination by averaging firms' exports by product, destination and year. In the panel regressions, we find a significant and negative impact of SPS measures imposed on Egypt's exports in both of the fixed and random effects models. On the other hand, these measures imposed by the Government of Egypt are insignificant in all the regressions. By contrast, when we pool our dataset and control for year, destination, products or HS1 or HS2 characteristics, we find that the effect of SPS measures is insignificant in all the regressions. Therefore, these results confirm the same finding of Table 1: SPS measures do not have a significant impact on the value of exports.

It is important to note that we do not prefer this set of regressions where the dependent variable is the average exports by product, destination and year given that it does not take

into account the heterogeneity available in the individual dataset (firm level). Indeed, extensive and intensive margins of trade are properly analyzed at firm level. For this reason, we can claim that the effect of SPS measures on the intensive margin of Egyptian exports is insignificant.

Table 3: The Impact of SPS Measures on Average Exports
(Intensive Margin)

	Pooled				Panel	
					FE	RE
	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)	Ln(Exp.)
Ln(GDP imp)	0.249	0.267	0.126	0.321	0.674***	0.0670***
	(0.200)	(0.209)	(0.217)	(0.235)	(0.161)	(0.0120)
Ln(Distance)	0.363	2.213	-0.137	-0.221	-	-0.371***
	(140,297)	(178,198)	(452,031)	(584,428)	-	(0.0325)
Contig	-0.360	0.0232	0.215	-0.0332	-	-0.610***
	(133,352)	(109,446)	(35,042)	(97,486)	-	(0.102)
Com. Lang	-0.349	1.505	-0.00301	-0.0824	-	-0.688***
	(211,408)	(216,060)	(414,496)	(582,435)	-	(0.0521)
Colony	0.341	3.597	-0.570	1.278	-	0.219**
	(156,863)	(165,281)	(1.070e+06)	(2.147e+06)	-	(0.0929)
Ln(Tariff)	0.271	-1.111	-0.557	0.0415	0.502	4.710***
	(1.298)	(1.346)	(1.400)	(1.526)	(1.038)	(0.421)
SPS on Egypt	**-0.199**	**0.478**	**-0.0911**	**-0.0794**	**-0.577****	**-0.639*****
	(0.300)	**(0.413)**	**(0.342)**	**(0.340)**	**(0.246)**	**(0.237)**
SPS by Egypt	**0.0884**	**-**	**-**	**-0.115**	**0.0384**	**-0.136**
	(0.259)	**-**	**-**	**(0.231)**	**(0.191)**	**(0.182)**
Constant					-7.326*	10.91***
					(4.115)	(0.344)
Year dummies	YES				YES	YES
Product dummies	YES					
Destination dummies	YES	YES	YES	YES		
Year-Product dummies		YES				
Year-HS2 dummies			YES			
Year-HS1 dummies				YES		
Observations	41774	41774	41774	38153	41774	41774
R-squared	0.327	0.396	0.215	0.141	0.023	
Number of identifiers					13667	13667

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

6.2. The Effect of SPS Measures on the Extensive Margin

Table 5 displays the effect of SPS measures on the extensive margin of exports (product-destination extensive margin of trade). We run three sets of regressions. The first one takes advantage of the panel dimension of our dataset. In both the fixed and the random effects estimations, we find that the SPS measures imposed on Egypt have a significantly negative impact on the extensive margin of exports. This means that SPS represents a fixed cost to enter a foreign market. Consequently, and according to the New Trade Models, the most productive firms in the industry are able to enter the exports market.

Table 5: The Impact of SPS Measures on the Probability of Exports (Extensive Margin) – Panel Regression

	Logit	
	FE	RE
	Prob(Exp)	Prob(Exp)
Ln(GDP imp)	1.147***	0.0373***
	(0.0517)	(0.00220)
Ln(Distance)		-0.0809***
		(0.00577)
Contig		0.347***
		(0.0168)
Com. Lang		-0.0646***
		(0.00820)
Colony		-0.419***
		(0.0152)
Ln(Tariff)	0.364	0.352***
	(0.350)	(0.0863)
SPS on Egypt	**-0.210***	**-0.375*****
	(0.118)	**(0.0840)**
SPS by Egypt	**0.904**	**-4.827*****
	(0.817)	**(0.722)**
Constant		-1.492***
		(0.0593)
Year dummies	YES	YES
Observations	702326	947201
No. of identifiers	132742	199865
R-squared		

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

The second set of our regressions pools our data and adds firm, year, product (or HS1 or HS2) dummies or different combinations of these dummies (Table 6). We find that SPS imposed on Egypt hinders the probability of exporting a product to a new destination in most of the regressions. This result remains robust whether we use a logit specification or

a linear probability model. Although the LPM does not produce consistent response probabilities, they are informative since the coefficients values are easily interpreted (elasticities for continuous variables). Consequently, we find that a SPS concern reduces the probability to export to a new destination by 4.9% (column E) or 7.4% (column B). Such a negative effect may be attributed to the increase in the costs for producers due to burdensome and separate certification, testing and inspection procedures in different export markets.

Table 6: The Impact of SPS Measures on the Probability of Exports (Extensive Margin) – Pooled Dataset

	Prob(Exp) A	Prob(Exp) B	Prob(Exp) C	Prob(Exp) D	Prob(Exp) E	Prob(Exp) F	Prob(Exp) G
Ln(GDP imp)	0.190***	0.00675***	0.191***	0.191***	0.218***	0.235***	0.230***
	(0.00853)	(0.000365)	(0.00813)	(0.00825)	(0.00821)	(0.00823)	(0.00851)
Ln(Distance)	-0.208	-0.0155***	-	0.0276	-0.395	-0.243	0.0935
	(1,007)	(0.000957)	-	(547.8)	(217.9)	(263.9)	(307.5)
Contig	0.129	0.0719***	-	0.238	-0.0489	0.182	0.349
	(942.6)	(0.00310)	-	(1,459)	(95.88)	(416.8)	(817.9)
Com. Lang	0.651	0.00837***	-	0.248	0.138	-0.212	-0.304
	(883.5)	(0.00149)	-	(1,399)	(210.6)	(383.0)	(385.5)
Colony	0.157	-0.0573***	-	0.262	0.0447	-0.366	0.159
	(734.4)	(0.00242)	-	(937.2)	(242.3)	(443.5)	(635.6)
Ln(Tariff)	0.0134	0.0193	0.0330	0.0330	0.00806	-0.0257	-0.0154
	(0.0588)	(0.0146)	(0.0555)	(0.0563)	(0.0552)	(0.0556)	(0.0583)
SPS on Egypt	**-0.0294**	**-0.0742*** **	**-0.0302**	**-0.0302**	**-0.0486*** **	**-0.0604*** **	**-0.0661*** **
	(0.0195)	**(0.0128)**	**(0.0184)**	**(0.0187)**	**(0.0182)**	**(0.0184)**	**(0.0192)**
SPS by Egypt	**0.132**	**-0.679*** **	**0.161**	**0.161**	**0.106**	**0.0650**	**-0.0214**
	(0.130)	**(0.111)**	**(0.124)**	**(0.125)**	**(0.124)**	**(0.125)**	**(0.130)**
Year dummies	YES	YES	YES	YES			
Firm dummies	YES	YES		YES			
Product dummies		YES	YES				
Destination dummies	YES			YES			
HS1 dummies	YES						
Firm-Destination dummies			YES		YES	YES	YES
Year-Product dummies					YES		
Year-HS2 dummies						YES	
Year-HS1 dummies							YES
Observations	879105	947201	947201	947201	947201	947201	879105
R-squared	0.066	0.071	0.151	0.065	0.191	0.159	0.148

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This is in line with the finding of Fontagné et al. (2013) who found that facing a SPS concern reduces the probability to export by 2%. Moreover, Crivelli and Groscht (2012)

have shown that SPS concerns reduce the probability of trade in agricultural and food products.

In Table 7, we examine the impact of SPS measures on the extensive margin by summing the number of firms per product and destination. We find an insignificant effect of SPS measures on this variable. However, as mentioned before, we do not prefer this econometric specification since it does not take into account the heterogeneity available in the individual dataset (firm level). Thus, the extensive margin of trade is better captured at the firm level.

Table 7: The Impact of SPS Measures on the Number of Firms (Extensive Margin)

	Pooled				Panel	
	Ln(Num. Firm.)	Ln(Num. Firm.)	Ln(Num. Firm.)	Ln(Num. Firm.)	FE Ln(Num. Firm.)	RE Ln(Num. Firm.)
Ln(GDP imp)	0.0806*	0.0958**	0.0519	0.0300	0.151***	0.0461***
	(0.0455)	(0.0489)	(0.0523)	(0.0570)	(0.0275)	(0.00260)
Ln(Distance)	-0.635	-0.111	-0.102	-0.179	-	-0.0538***
	(32,222)	(39,964)	(100,297)	(111,970)	-	(0.00709)
Contig	0.884	0.0691	-0.0192	0.00790	-	0.175***
	(31,238)	(26,166)	(8,893)	(28,820)	-	(0.0219)
Com. Lang	0.974	0.319	0.283	0.643	-	0.206***
	(51,800)	(48,950)	(104,986)	(151,192)	-	(0.0114)
Colony	0.391	-0.202	0.0727	-1.348	-	-0.0290
	(35,573)	(39,468)	(296,075)	(415,424)	-	(0.0201)
Ln(Tariff)	0.254	0.193	0.0572	-0.0277	0.158	-0.363***
	(0.296)	(0.315)	(0.338)	(0.371)	(0.177)	(0.0874)
SPS on Egypt	**0.000587**	**0.0369**	**-0.00650**	**0.0825**	**0.0343**	**0.0513**
	(0.0684)	**(0.0966)**	**(0.0825)**	**(0.0827)**	**(0.0420)**	**(0.0413)**
SPS by Egypt	**-0.0361**	**-**	**-**	**-0.435*** **	**-0.0228**	**-0.0453**
	(0.0588)	**-**	**-**	**(0.0559)**	**(0.0326)**	**(0.0318)**
Constant					-2.844***	0.134*
					(0.702)	(0.0752)
Year dummies	YES				YES	YES
Product dummies	YES					
Destination dummies	YES	YES	YES	YES		
Year-Product dummies		YES				
Year-HS2 dummies			YES			
Year-HS1 dummies				YES		
Observations	41775	41775	41775	38154	41775	41775
R-squared	0.413	0.444	0.230	0.145	0.016	
Number of identifiers					13668	13668

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

In summary, our main findings show that SPS measures imposed on Egyptian exporters have a negative impact on the probability of exporting a new product to a new destination. The intensive margin of exports is not significantly affected by such measures.

7. Conclusion and Policy Implications

According to World Trade Organization (WTO) standards, countries are allowed to adapt regulations under the Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade (TBT) agreements in order to protect human, animal and plant health as well as environment and human safety.

This paper contributes to the literature in three ways. First, it marks one of the very first studies on developing countries on the topic, and the first in the MENA region. It also uses a unique dataset constructed by the authors using a new database on specific trade concerns (STC) raised in the TBT and SPS committees at the WTO. Thus, we create a dataset that could be combined with Egyptian firm-level data. Finally, we examine the impact of these measures on both the extensive (the probability of exporting to a new destination) and the intensive (the value exported) margins of exports using a gravity model. Our main findings show that SPS measures imposed on Egyptian exporters have a negative impact on the probability of exporting a new product to a new destination. By contrast, the intensive margin of exports is not significantly affected by such measures.

At the policymaking level, given that only productive firms will be able to bear the higher costs incurred by complying with the SPS measures, governments should support firms to increase their quality and productivity, in order to export. This can take place through government export promotion programs through business incentives for exporting firms (by simplifying procedures to start a business and to export), quick clearance and delivery of products to be exported, quality assurance support from government institutions to help firm comply with international standards. Improved quality will not only encourage SPS imposing countries to remove their SPS measures, but would also allow exporting firms to sell their products to new destinations that have high quality standards (destination extensive margin). In addition, firms will be able to export new varieties to the existing destinations (product extensive margin), as well as new ones (product-destination extensive margin). The MENA region is actually characterized by low export market shares and low competitiveness in global markets. Improving exporters' competitiveness and increasing the number of exporters can help countries resolve this structural issue and improve their economic performance, as strong export performance is usually associated with high economic growth.

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